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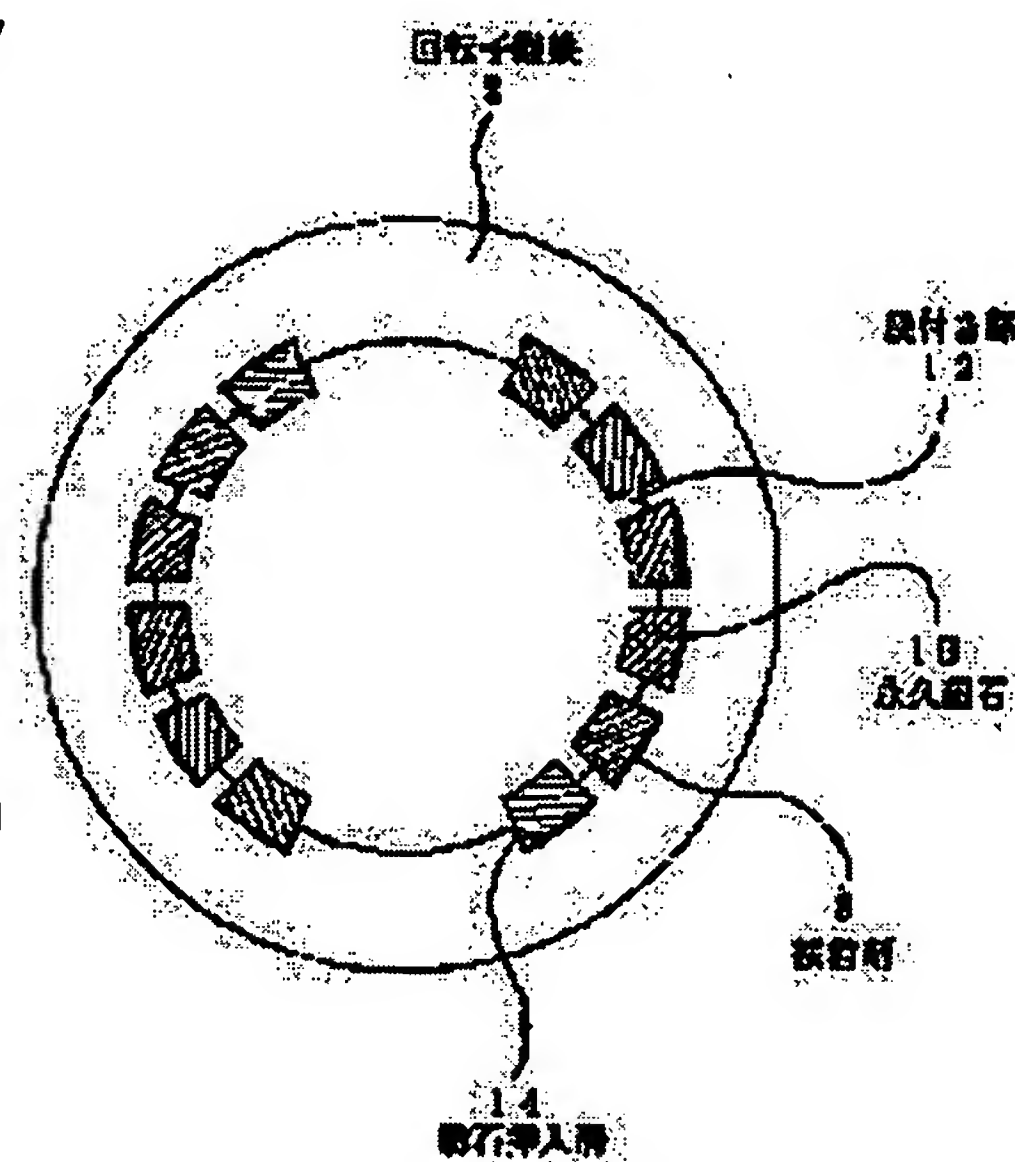
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(54) ROTOR OF OUTER-ROTOR-TYPE MACHINE

(57)Abstract:

PROBLEM TO BE SOLVED: To raise the work efficiency by facilitating and securing the sticking fixation work of plural permanent magnets arranged on the inside peripheral face of the yoke of the rotor of an outer-rotor-type of rotating machine.

SOLUTION: This rotor is provided with a required number of stepped parts 12, which function as bulkheads to separate the plural permanent magnets 1B stored in parallel in the direction of a rotor axis from each other and also form, in pairs, magnet insertion grooves at the inside peripheral face of a cylindrical rotor yoke 2. Then, a plurality of permanent magnets are inserted into these magnet insertion grooves, and are bonded and fixed by an adhesive 8 so as to form a rotor.



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CLAIMS

[Claim(s)]

[Claim 1] It is the rotator of the outer rotor form dynamo-electric machine which comes to carry two or more permanent magnets which form one synthetic magnetic pole in a bore side. With, it required-number-****. while functioning as a septum which separates between both the permanent magnets of said plurality contained by rotator shaft orientations at juxtaposition at the bore side of a rotator yoke -- a pair -- the section with a stage which forms a magnet insertion slot The rotator of the outer rotor form dynamo-electric machine characterized by coming to carry out insertion immobilization of said each permanent magnet in magnet insertion slots, such as this which was formed.

[Claim 2] The rotator of the outer rotor form dynamo-electric machine characterized by the cross-section configuration of the direction of a rotator periphery of said section with a stage making a trapezoid in the formation part of said magnet insertion slot in the rotator of an outer rotor form dynamo-electric machine according to claim 1.

[Claim 3] The rotator of the outer rotor form dynamo-electric machine characterized by the cross-section configuration of the direction of a rotator periphery of said section with a stage making a rectangle in the formation part of said magnet insertion slot in the rotator of an outer rotor form dynamo-electric machine according to claim 1.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the rotator of the outer rotor form dynamo-electric machine which comes to carry two or more permanent magnets which form one synthetic magnetic pole in a bore side.

[0002]

[Description of the Prior Art] What was conventionally carried in the rotator of this kind of outer rotor form dynamo-electric machine as the permanent magnet for field pole formation was shown in the direction sectional view of a periphery of the rotator of the outer rotor form dynamo-electric machine of drawing 5 is known. In addition, drawing 4 is instantiation of the axial sectional view of an outer rotor form dynamo-electric machine.

[0003] First, in drawing 4, the permanent magnet for field pole formation in 1, the rotator yoke in which 2 attaches a permanent magnet 1, a shaft-orientations fastener [as opposed to a permanent magnet 1 in 3], a rotor axis [in / in 4 / an outer rotor form dynamo-electric machine], and 5 are stator windings arranged at the stator axis 7 on the periphery of the stator core 6 by which insertion fixing was carried out.

[0004] next, the thing which shows the direction cross section of a periphery where drawing 5 passes along the permanent magnet section of said dynamo-electric machine rotator -- it is -- the inner skin of the rotator yoke 2 of a cylindrical shape -- meeting -- the permanent magnet 1 of plurality [inner skin / this] -- next to each other -- piece piece sequence -- or alternately, it sticks with adhesives 8, and arranges, and the rotator of the outer rotor form dynamo-electric machine in which the equivalent synthetic N pole 9 and the synthetic south pole 10 were made to form by magnetic-flux composition of two or more permanent magnets is illustrated.

[0005]

[Problem(s) to be Solved by the Invention] However, as shown in drawing 5, in order to arrange two or more permanent magnets side by side and to perform equivalent magnetic pole formation, when attaching a permanent magnet in piece piece sequence like the above-mentioned, the repulsive force of the magnets of ***** like-pole nature is very large, and it is necessary to fix all magnets with a firm magnet fixture in order until adhesives dry, and a very complicated activity will be required.

[0006] The example of an improvement of the above-mentioned work content is illustrated to drawing 6. it is ***** about the progress of an assembly until drawing 6 is the same sectional view as drawing 5 and it arranges said two or more permanent magnets like drawing 5 here.

[0007] That is, said two or more permanent magnets are divided into two groups, and even a magnet vacates spacing of a part and makes the inner skin of the rotator yoke 2 stick and dry permanent magnet 1a of the 1st group at intervals first. In this case, while sufficient spacing to weaken the repulsive force of the magnets of like-pole nature is between each permanent magnet of the 1st group, workability becomes good in order that an aforementioned rotator yoke and an aforementioned permanent magnet may attract each other.

[0008] Next, after the adhesives 8 which stick each permanent magnet of the 1st group dry, permanent magnet 1b of the 2nd group is stuck with adhesives 8 in order between each permanent magnet of this group, and it fixes and places with a magnet fixture until the adhesives of each magnets, such as this, dry. In this case, although each permanent magnet of the 1st group and repulsion which each permanent magnet of the 2nd group has in those both sides are carried out, in order that each permanent magnet of the 1st group may make the role of a guide by one side, workability improves.

[0009] However, unless it is after adhesives overflow into the rotator yoke section after attaching the permanent magnet of the 1st group, solidifying and completing removal of these overflowing adhesives when performing attachment arrangement of each permanent magnet like the above, the attachment activity of the permanent magnet of the 2nd group cannot be begun, and workability is not good.

[0010] Moreover, unless it makes exact the spacing dimension between each permanent magnet of the 1st group and is doing the attachment activity, it becomes impossible to arrange each permanent magnet of the 2nd group, for this reason, it is necessary to do very carefully the attachment activity of each permanent magnet of the 1st group between each permanent magnet of the 1st group, and workability is not good for it.

[0011] In view of the above, about the rotator of the outer rotor form dynamo-electric machine which comes to carry two or more permanent magnets which form one synthetic magnetic pole in a bore side, this invention does the attachment fixed activity of two or more of said permanent magnets to rotator yoke inner skin correctly and easy, improves workability and aims at offer of the rotator of the outer rotor form dynamo-electric machine which can attain cheap-ization as said whole motor.

[0012]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, it sets to the rotator of the outer rotor form dynamo-electric machine of this invention. Invention of one claim 1 It is the rotator of the outer rotor form dynamo-electric machine which comes to carry two or more permanent magnets which form one synthetic magnetic pole in a bore side. while functioning as a septum which separates between both the permanent magnets of said plurality contained by rotator shaft orientations at juxtaposition at the bore side of a rotator yoke -- a pair -- with, it shall come to carry out [insertion immobilization of said each permanent magnet] the section with a stage which forms a magnet insertion slot in magnet insertion slots, such as required-number **** and this which was formed

[0013] 2) In the rotator of an outer rotor form dynamo-electric machine according to claim 1, as for invention of claim 2, the cross-section configuration of the direction of a rotator periphery of said section with a stage shall make a trapezoid in the formation part of said magnet insertion slot.

[0014] 3) In the rotator of an outer rotor form dynamo-electric machine according to claim 1, as for invention of claim 3, the cross-section configuration of the direction of a rotator periphery of said section with a stage shall make a rectangle in the formation part of said magnet insertion slot.

[0015] In order that this invention may place in a fixed position two or more permanent magnets for field pole formation along with the yoke inner skin of an outer rotor form dynamo-electric machine rotator like the above, while separating between the permanent magnets of adjacent like-pole nature with suitable spacing and decreasing the repulsive force between both magnets suitably, it makes into a main point to prepare the section with a stage which forms a magnet insertion slot.

[0016]

[Embodiment of the Invention] The example of this invention is explained according to each drawing of drawing 1 - drawing 3 R> 3 below. Direction sectional view of a periphery, drawing 2 , and drawing 3 R> 3 of drawing 1 of a rotator of an outer rotor form dynamo-electric machine are the direction sectional view of a periphery of the section with a stage of the rotator of an outer rotor form dynamo-electric machine, and the permanent magnet section here.

[0017] First, drawing 1 is what shows the direction cross section of a periphery which passes along the permanent magnet section of said dynamo-electric machine rotator. Although the 1st example of this invention according to claim 1 is shown, and the condition of having inserted in the inner skin of the rotator yoke 2 of a cylindrical shape along the magnet insertion slot 14 in which the section 12 with a stage of a ***** pair forms two or more permanent magnet 1B, and having placed in a fixed position

with adhesives 8 is not shown and not being illustrated although illustrated to above-mentioned drawing 5 -- **** -- equivalent synthetic N pole and the synthetic south pole are made to form

[0018] Next, the section 11 with a trapezoid stage in which drawing 2 shows the direction cross section of a periphery of the section with a stage of said dynamo-electric machine rotator, and the permanent magnet section to, the 2nd example of this invention according to claim 2 is shown, and the cross-section configuration of the direction of a periphery makes a trapezoid, The cross-section configuration of the direction of a periphery by which insertion arrangement was carried out shows rectangle permanent magnet 1A which makes a rectangle to the magnet insertion slot 13 which said section 11 with a stage which adjoins each other and makes a pair forms.

[0019] Next, the section 12 with an parallel stage in which drawing 3 shows the direction cross section of a periphery of the section with a stage of said dynamo-electric machine rotator, and the permanent magnet section to, the 3rd example of this invention according to claim 3 is shown, and the cross-section configuration of the direction of a periphery makes a rectangle, The cross-section configuration of the direction of a periphery by which insertion arrangement was carried out shows trapezoid permanent magnet 1B which makes a trapezoid to the magnet insertion slot 14 which said section 12 with a stage which adjoins each other and makes a pair forms.

[0020]

[Effect of the Invention] According to this invention, it is related with the rotator of the outer rotor form dynamo-electric machine which comes to carry two or more permanent magnets which form one synthetic magnetic pole in a bore side. In order to place in a fixed position two or more permanent magnets for field pole formation along with [so that according to invention of claim 1] the inner skin of a rotator yoke By preparing the section with a stage which forms a magnet insertion slot with a pair, while separating between the permanent magnets of adjacent like-pole nature with suitable spacing, carrying out insertion immobilization and arranging said each permanent magnet into magnet insertion slots, such as this It becomes possible to place a permanent magnet in a fixed position in a predetermined location correctly and easily along the magnet insertion slot which the section with a stage which makes a pair while weakening the repulsive force between the permanent magnets of adjacent like-pole nature forms. An extensive improvement of the workability of the attachment arrangement activity of each of said permanent magnet is enabled, and it can contribute to cheap-ization as said whole dynamo-electric machine.

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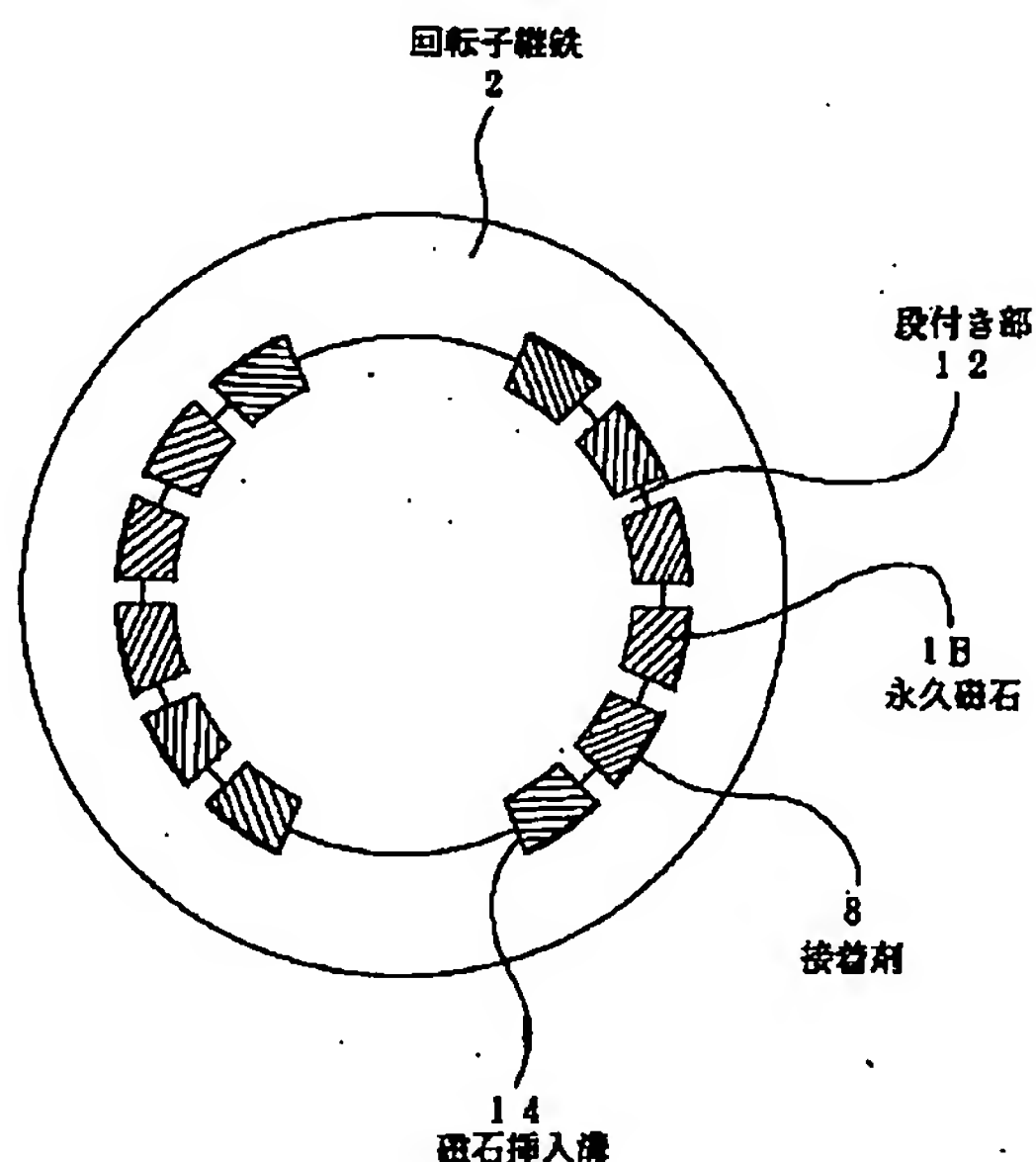
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(54)【発明の名称】 アウターロータ形回転電機の回転子

(57)【要約】

【課題】アウターロータ形回転電機の回転子の継鉄内周面に配置される複数の永久磁石の貼り付け固定作業を容易且つ確実にして作業性の改善を図る。

【解決手段】円筒形の回転子継鉄2の内周面に回転子軸方向に並列に収納される複数の永久磁石1B相互の間を分離する隔壁として機能すると共に対を以て磁石挿入溝14を形成する段付き部12を所要数設け、形成されたこれ等の磁石挿入溝に前記複数の永久磁石を挿入し、接着剤8により接着固定して前記回転子を形成する。



【特許請求の範囲】

【請求項1】一つの合成磁極を形成する複数の永久磁石を内径側に搭載してなるアウターロータ形回転電機の回転子であって、回転子継鉄の内径側において回転子軸方向に並列に収納される前記複数の永久磁石相互の間を分離する隔壁として機能すると共に対を以て磁石挿入溝を形成する段付き部を所要数設け、形成されたこれ等の磁石挿入溝に前記各永久磁石を挿入固定してなる事を特徴とするアウターロータ形回転電機の回転子。

【請求項2】請求項1記載のアウターロータ形回転電機の回転子において、前記段付き部の回転子外周方向の断面形状が前記磁石挿入溝の形成部位において台形をなす事を特徴とするアウターロータ形回転電機の回転子。

【請求項3】請求項1記載のアウターロータ形回転電機の回転子において、前記段付き部の回転子外周方向の断面形状が前記磁石挿入溝の形成部位において矩形をなす事を特徴とするアウターロータ形回転電機の回転子。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は、一つの合成磁極を形成する複数の永久磁石を内径側に搭載してなるアウターロータ形回転電機の回転子に関する。

【0002】

【従来の技術】従来この種のアウターロータ形回転電機の回転子においては、界磁極形成用の永久磁石を図5のアウターロータ形回転電機の回転子の外周方向断面図に示す如く搭載したものが知られている。なお、図4はアウターロータ形回転電機の軸方向断面図の例示である。

【0003】先ず、図4において、1は界磁極形成用の永久磁石、2は永久磁石1を取り付ける回転子継鉄、3は永久磁石1に対する軸方向固定具、4はアウターロータ形回転電機における回転子軸、5は固定子軸7に挿入固着された固定子鉄心6の外周上に配置された固定子巻線である。

【0004】次に、図5は前記回転電機回転子の永久磁石部を通る外周方向断面を示すものであり、円筒形の回転子継鉄2の内周面に沿ってこの内周面に複数の永久磁石1を隣合わせに、一個一個順番に或いは一つおきに、接着剤8により貼り合わせて配置し、複数の永久磁石の磁束合成により等価的な合成N極9と合成S極10とを形成させたアウターロータ形回転電機の回転子を例示するものである。

【0005】

【発明が解決しようとする課題】しかしながら、図5に示す如く複数の永久磁石を隣合わせに配置して等価的な磁極形成を行うために、前述の如く、永久磁石を一個一個順番に取り付ける場合には、隣合う同極性の磁石同士の反発力が非常に大きく、接着剤が乾燥するまで全ての磁石を順番に強固な磁石固定治具で固定しておく必要があり、極めて煩雑な作業を要する事になる。

【0006】上記作業内容の改善例を図6に例示する。ここに、図6は図5と同様の断面図であり、前記複数の永久磁石を図5の如く配置するまでの組み立ての途中経過を例示するものである。

【0007】即ち、先ず、前記複数の永久磁石を2つの群に分け、第1群の永久磁石1aを磁石一つ分の間隔を空けて飛び飛びに回転子継鉄2の内周面に貼り付けて乾燥させる。この場合、第1群の各永久磁石間には同極性の磁石同士の反発力を弱めるに十分な間隔があると共に、前記の回転子継鉄と永久磁石とが吸引し合うために作業性は良くなる。

【0008】次に、第1群の各永久磁石を貼りつける接着剤8が乾燥した後に、この群の各永久磁石の間に第2群の永久磁石1bを順番に接着剤8により貼り付け、これ等各磁石の接着剤が乾燥するまでは磁石固定治具で固定して置くものである。この場合、第2群の各永久磁石はその両面にある第1群の各永久磁石と反発はするが一方で第1群の各永久磁石がガイドの役をなすために作業性は改善される。

【0009】しかしながら、前記の如く各永久磁石の貼り付け配置を行う場合には第1群の永久磁石を取り付けた後の回転子継鉄部には接着剤がはみ出して固化しており、このはみ出した接着剤の除去作業が完了した後でないと第2群の永久磁石の貼り付け作業を始める事は出来ず、作業性は良くない。

【0010】また、第1群の各永久磁石間の間隔寸法を正確にして貼り付け作業を行っていないと、第1群の各永久磁石間に第2群の各永久磁石を配置する事が出来なくなり、このため第1群の各永久磁石の貼り付け作業は極めて慎重に行う必要があり、作業性は良くない。

【0011】上記に鑑みこの発明は、一つの合成磁極を形成する複数の永久磁石を内径側に搭載してなるアウターロータ形回転電機の回転子に関して、回転子継鉄内周面への前記複数の永久磁石の貼り付け固定作業を正確且つ容易にして作業性を改善し、前記電動機の全体としての低廉化を図り得るアウターロータ形回転電機の回転子の提供を目的とするものである。

【0012】

【課題を解決するための手段】上記目的を達成するために、この発明のアウターロータ形回転電機の回転子において、

1) 請求項1の発明は、一つの合成磁極を形成する複数の永久磁石を内径側に搭載してなるアウターロータ形回転電機の回転子であって、回転子継鉄の内径側において回転子軸方向に並列に収納される前記複数の永久磁石相互の間を分離する隔壁として機能すると共に対を以て磁石挿入溝を形成する段付き部を所要数設け、形成されたこれ等の磁石挿入溝に前記各永久磁石を挿入固定してなるものとする。

【0013】2) 請求項2の発明は、請求項1記載のア

ウターロータ形回転電機の回転子において、前記段付き部の回転子外周方向の断面形状が前記磁石挿入溝の形成部位において台形をなすものとする。

【0014】3) 請求項3の発明は、請求項1記載のウターロータ形回転電機の回転子において、前記段付き部の回転子外周方向の断面形状が前記磁石挿入溝の形成部位において矩形をなすものとする。

【0015】上記の如くこの発明は、アウターロータ形回転電機回転子の継鉄内周面に沿って界磁極形成用の複数の永久磁石を固定配置するために、隣り合う同極性の永久磁石間を適当な間隔をもって隔てて両磁石間の反発力を適当に減少させると共に磁石挿入溝を形成する段付き部を設ける事を骨子とするものである。

【0016】

【発明の実施の形態】以下この発明の実施例を図1～図3の各図面に従って説明する。ここに、図1はアウターロータ形回転電機の回転子の外周方向断面図、図2と図3とはアウターロータ形回転電機の回転子の段付き部と永久磁石部の外周方向断面図である。

【0017】先ず、図1は前記回転電機回転子の永久磁石部を通る外周方向断面を示すものであり、請求項1に従うこの発明の第1の実施例を示し、円筒形の回転子継鉄2の内周面に複数の永久磁石1Bを隣合う一対の段付き部12の形成する磁石挿入溝14に沿って挿入し接着剤8により固定配置した状態を示すものであり、図示してはいないが、前述の図5に例示するが如き等価的な合成N極と合成S極とを形成させるものである。

【0018】次に、図2は前記回転電機回転子の段付き部と永久磁石部の外周方向断面を示すものであり、請求項2に従うこの発明の第2の実施例を示し、外周方向の断面形状が台形をなす台形段付き部11と、隣り合って対をなす前記段付き部11の形成する磁石挿入溝13に挿入配置された外周方向の断面形状が矩形をなす矩形永久磁石1Aと、を示すものである。

【0019】次に、図3は前記回転電機回転子の段付き部と永久磁石部の外周方向断面を示すものであり、請求項3に従うこの発明の第3の実施例を示し、外周方向の断面形状が矩形をなす平行段付き部12と、隣り合って対をなす前記段付き部12の形成する磁石挿入溝14に挿入配置された外周方向の断面形状が台形をなす台形永久磁石1Bと、を示すものである。

【0020】

【発明の効果】この発明によれば、一つの合成磁極を形成する複数の永久磁石を内径側に搭載してなるアウターロータ形回転電機の回転子に関して、請求項1の発明に

よる如く、回転子継鉄の内周面に沿って界磁極形成用の複数の永久磁石を固定配置するために、隣り合う同極性の永久磁石間を適当な間隔をもって隔てると共に対をもって磁石挿入溝を形成する段付き部を設け、これ等の磁石挿入溝に前記各永久磁石を挿入固定して配置する事により、隣り合う同極性の永久磁石間の反発力を弱めると共に対をなす段付き部の形成する磁石挿入溝に沿って永久磁石を正確且つ容易に所定位置に固定配置する事が可能となり、前記各永久磁石の貼り付け配置作業の作業性の大幅な改善を可能として前記回転電機全体としての低廉化に寄与する事が出来る。

【図面の簡単な説明】

【図1】この発明の第1の実施例を示すアウターロータ形回転電機の回転子の外周方向断面図

【図2】この発明の第2の実施例を示すアウターロータ形回転電機の回転子の段付き部と永久磁石部の外周方向断面図

【図3】この発明の第3の実施例を示すアウターロータ形回転電機の回転子の段付き部と永久磁石部の外周方向断面図

【図4】アウターロータ形回転電機の軸方向断面図

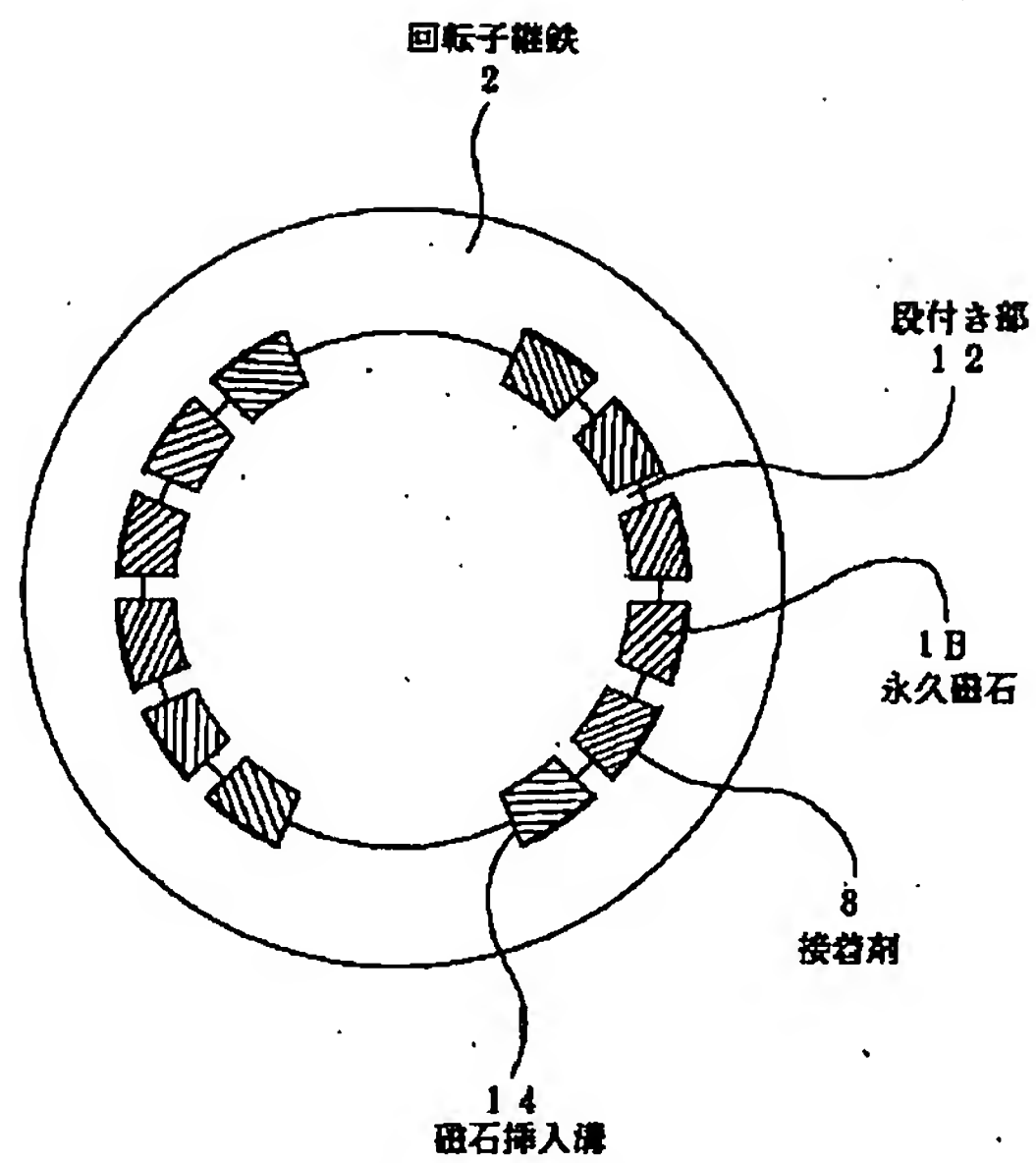
【図5】従来技術の例を示すアウターロータ形回転電機の回転子の外周方向断面図

【図6】従来技術の例を示すアウターロータ形回転電機の回転子の外周方向断面図

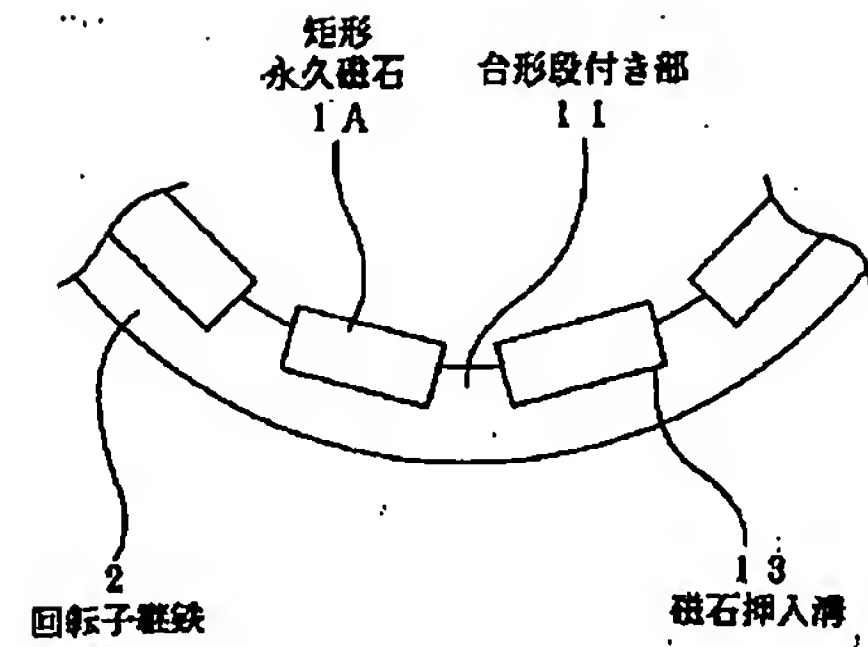
【符号の説明】

- 1 永久磁石
- 1A 矩形永久磁石
- 1B 台形永久磁石
- 1a 永久磁石
- 1b 永久磁石
- 2 回転子継鉄
- 3 軸方向固定具
- 4 回転子軸
- 5 固定子巻線
- 6 固定子鉄心
- 7 固定子軸
- 8 接着剤
- 9 合成N極
- 10 合成S極
- 11 台形段付き部
- 12 平行段付き部
- 13 磁石挿入溝
- 14 磁石挿入溝

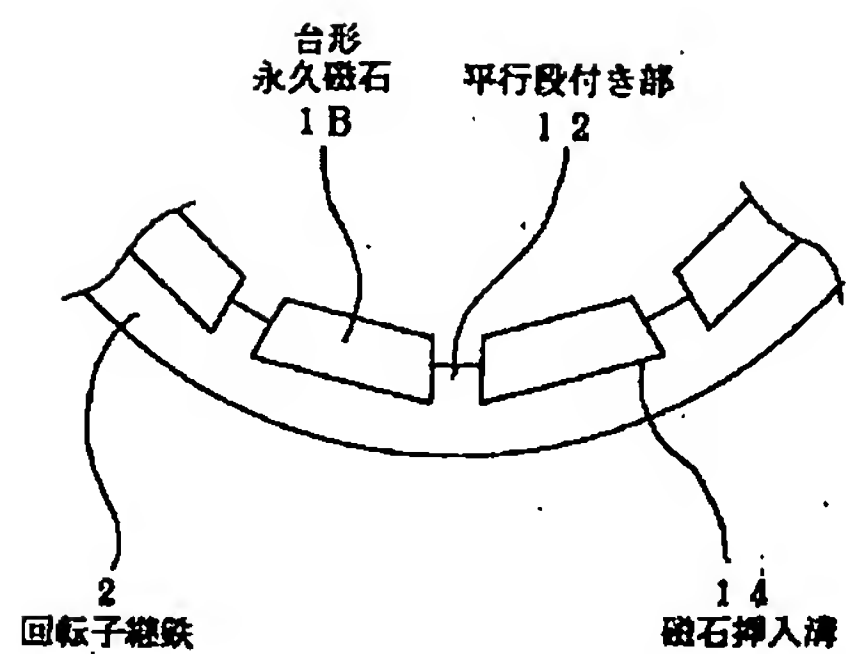
【図1】



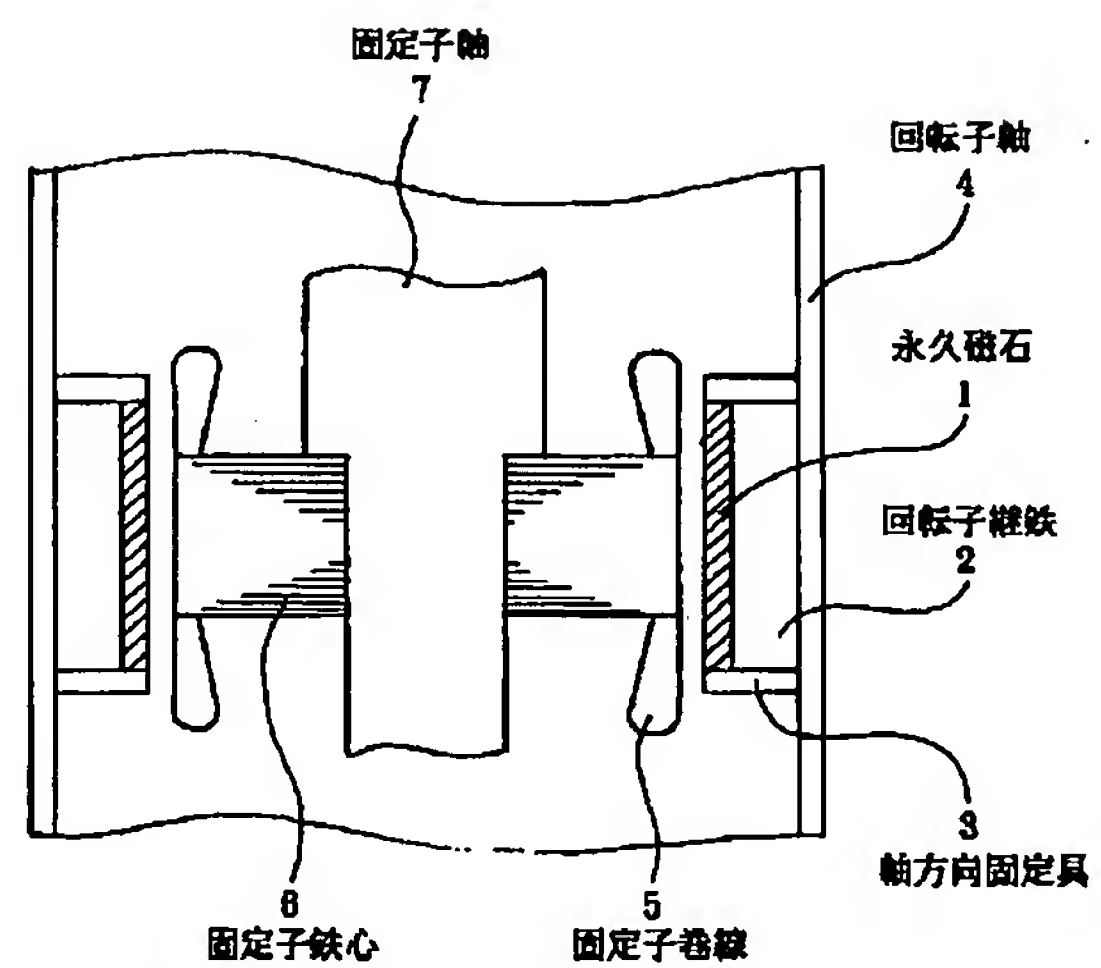
【図2】



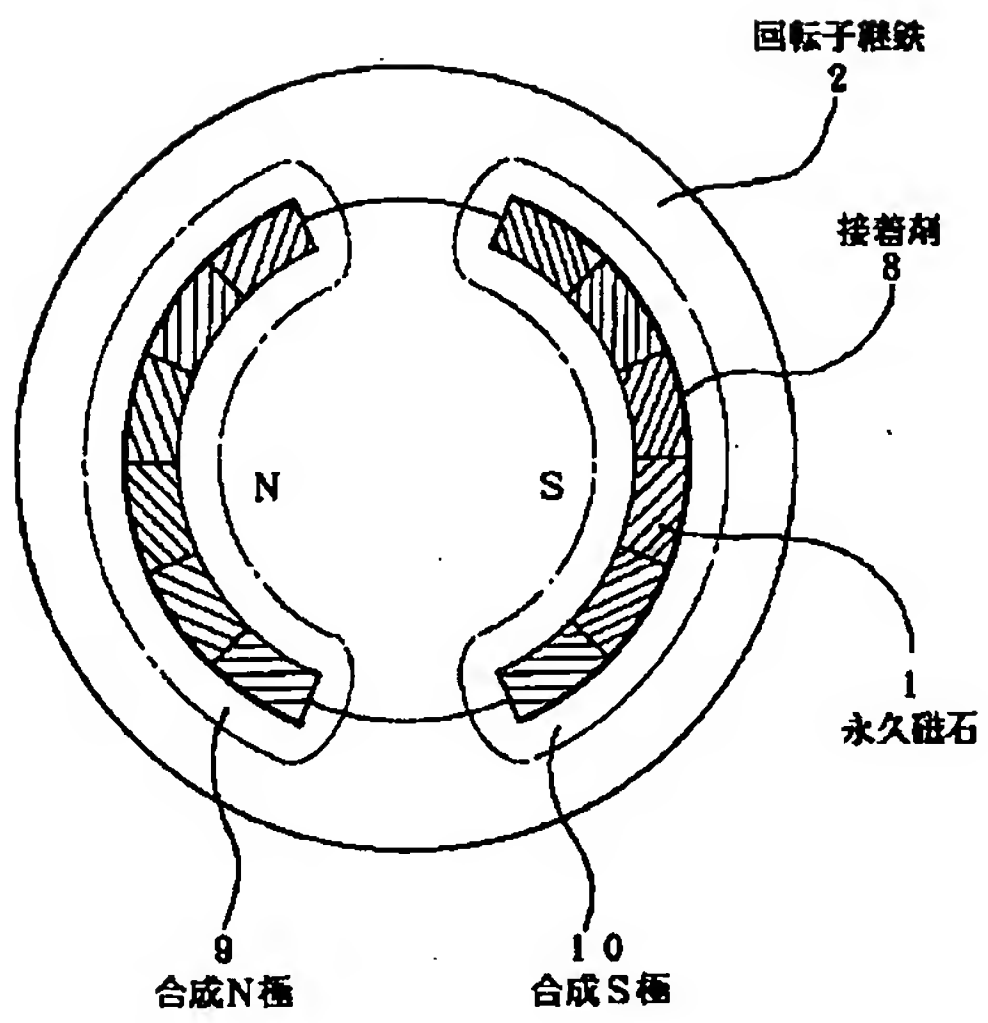
【図3】



【図4】



【図5】



【図6】

